EITEL-McCULLOUGH, INC.

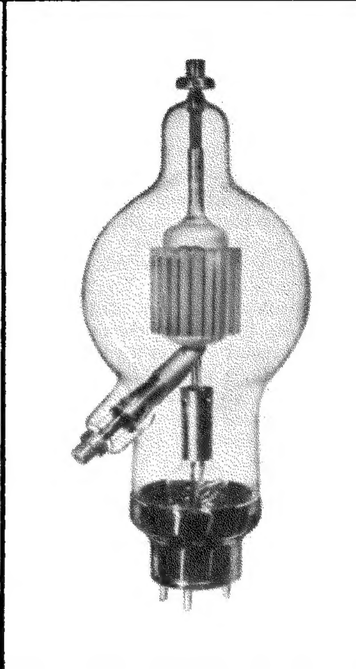
SAN BRUNO, CALIFORNIA

1500T

MEDIUM-MU TRIODE

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MODULATOR
OSCILLATOR
AMPLIFIER



The Eimac 1500T is a medium-mu, high-vacuum transmitting triode intended for amplifier, oscillator and modulator service. It has a maximum plate dissipation rating of 1500 watts. Cooling of the 1500T is accomplished by radiation from the plate, which operates at a visibly red temperature at maximum dissipation, and by means of forced air circulation around the envelope and at the seals.

GENERAL CHARACTERISTICS

ELECTRICAL

Filament: Thoriated tungsten

Voltage	7.5 volts
Current	24.0 amperes
Amplification Factor (Average)	24

Direct Interelectrode Capacitances (Average)

Grid-Plate	7.2 $\mu\mu$fd.
Grid-Filament	9.9 $\mu\mu$fd.
Plate-Filament	1.5 $\mu\mu$fd.
Transconductance (i_b = 1.25 amp., E_b = 6000 v., E_c = −155 v.)	10,000 μmhos

MECHANICAL

Base	Special 4-pin, No. 5005B
Basing	RMA type 4BD
Cooling	Radiation and forced air

Maximum Overall Dimensions:

Length	17.0 inches
Diameter	7.125 inches
Net Weight	3.5 pounds
Shipping Weight (Average)	8.5 pounds

RADIO FREQUENCY POWER AMPLIFIER AND OSCILLATOR

Class-C Telegraphy (Key-down conditions, 1 tube)

MAXIMUM RATINGS (Frequencies below 40 Mc.)

D-C PLATE VOLTAGE	▶8000 MAX. VOLTS
D-C PLATE CURRENT	1.25 MAX. AMPS.
PLATE DISSIPATION	1500 MAX. WATTS
GRID DISSIPATION	125 MAX. WATTS

TYPICAL OPERATION (Frequencies below 40 Mc.)

D-C Plate Voltage	5000	6000	7000	volts
D-C Grid Voltage	−375	−600	−500	volts
D-C Plate Current	1.00	1.00	.860	amps.
D-C Grid Current	150	165	110	ma.
Grid Dissipation	59	61	30	watts
Peak R-F Grid Input Voltage (approx.)	850	1100	885	volts
Driving Power (approx.)	115	160	85	watts
Plate Power Input	5000	6000	6000	watts
Plate Dissipation	1500	1500	1500	watts
Plate Power Output	3500	4500	4500	watts

AUDIO FREQUENCY POWER AMPLIFIER AND MODULATOR

Class-B (Sinusoidal wave, two tubes unless otherwise specified)

MAXIMUM RATINGS

D-C PLATE VOLTAGE	▶8000 MAX. VOLTS
MAX-SIGNAL D-C PLATE CURRENT, PER TUBE	1.25 MAX. AMPS.
PLATE DISSIPATION, PER TUBE	1500 MAX. WATTS
GRID DISSIPATION, PER TUBE	125 MAX. WATTS

TYPICAL OPERATION

D-C Plate Voltage	4000	5000	6000	volts
D-C Grid Voltage (approx.)	−95	−145	−190	volts
Zero-Signal D-C Plate Current	500	400	330	ma.
Max-Signal D-C Plate Current	1.88	1.72	1.65	amps.
Effective Load, Plate-to-Plate	4150	6150	8200	ohms
Peak A-F Grid Input Voltage (per tube)	485	535	570	volts
Max-Signal Avg. Driving Power (approx.)	95	105	115	watts
Max-Signal Plate Dissipation	1500	1500	1450	watts
Max-Signal Plate Power Output	4500	5600	7000	watts

▶ Indicates change from sheet dated 7-1-44.



APPLICATION

MECHANICAL

Mounting—The 1500T must be mounted vertically, base up or base down. Flexible connecting straps should be provided between the grid and plate terminals and the external grid and plate circuits. The tube must be protected from severe vibration and shock.

Cooling—The envelope and seals of the 1500T require artificial cooling. An ordinary 8- or 10-inch fan located one foot from the tube will provide sufficient air for cooling the envelope. The air should be directed at the tube in a manner which will allow the most uniform cooling of the envelope. The grid and plate seals each require a minimum flow of two cubic feet of air per minute. The air for the grid seal is fed through the grid connector. A special connector (Eimac HR-9) is available for this purpose. A special heat-dissipating connector (Eimac HR-8) is also available for use on the plate terminal. A minimum flow of two cubic feet of air per minute must likewise be supplied to the filament seals through the hole at the center of the base. Suitable electrical interlocks should be provided to remove the plate and filament voltages in the event that the supply of cooling air is interrupted.

ELECTRICAL

Filament Voltage—The filament voltage, as measured directly at the filament pins, should be between 7.125 and 7.875 volts.

Bias Voltage—Although there is no maximum limit on the bias voltage which may be used on the 1500T, there is little advantage in using bias voltages in excess of those given under "Typical Operation," except in certain very specialized applications. Where bias is obtained by a grid leak, suitable protective means must be provided to prevent excessive plate dissipation in the event of loss of excitation.

Plate Voltage—The plate supply voltage for the 1500T should not exceed 8000 volts. In most cases there is little advantage in using plate-supply voltages higher than those given under "Typical Operation" for the power output desired.

Grid Dissipation—The power dissipated by the grid of the 1500T must not exceed 125 watts. Grid dissipation may be calculated from the following expression:

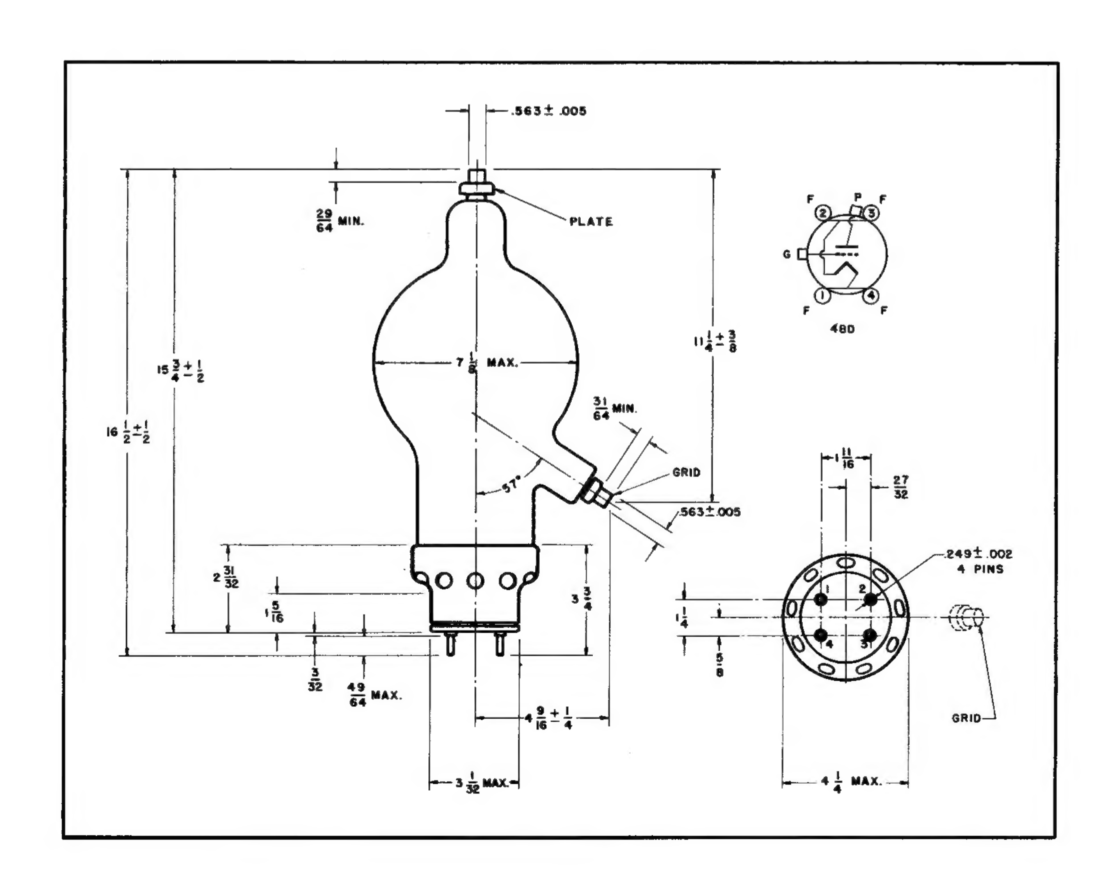
$$P_g = e_{cmp} I_c$$

where P_g = Grid dissipation,
e_{cmp} = Peak positive grid voltage, and
I_c = D-c grid current.

e_{cmp} may be measured by means of a suitable peak voltmeter connected between filament and grid.[1] In equipment in which the plate loading varies widely, such as oscillators used for radio-frequency heating, care should be taken to make certain that the grid dissipation does not exceed the maximum rating under any condition of loading.

Plate Dissipation—Under normal operating conditions, the power dissipated by the plate of the 1500T should not be allowed to exceed 1500 watts. Plate dissipation in excess of the maximum rating is permissible for short periods of time, such as during tuning procedures.

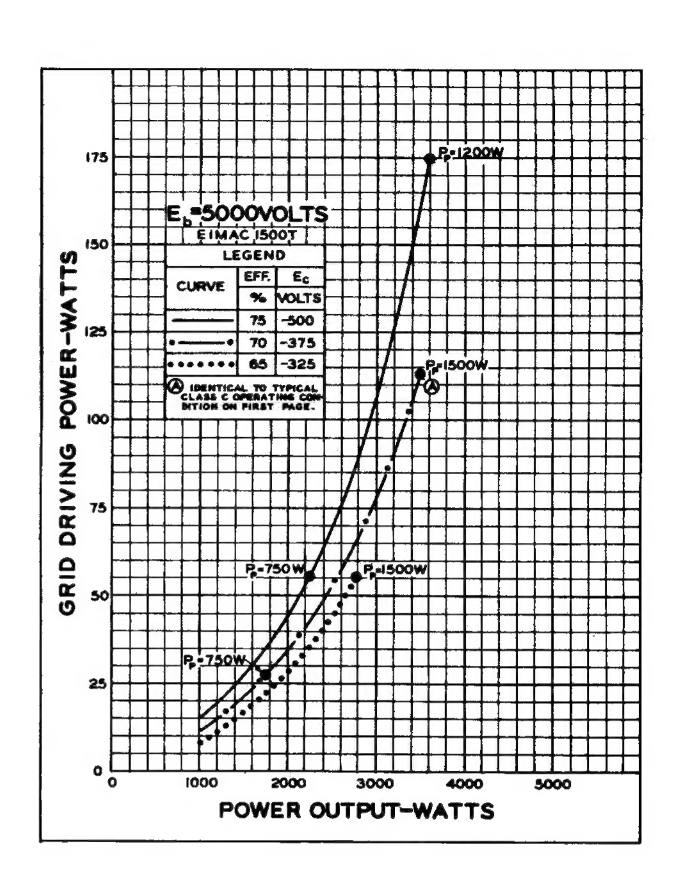
[1] For suitable peak v.t.v.m. circuits see, for instance, "Vacuum Tube Ratings," **Eimac News**, January, 1945. This article is available in reprint form on request.

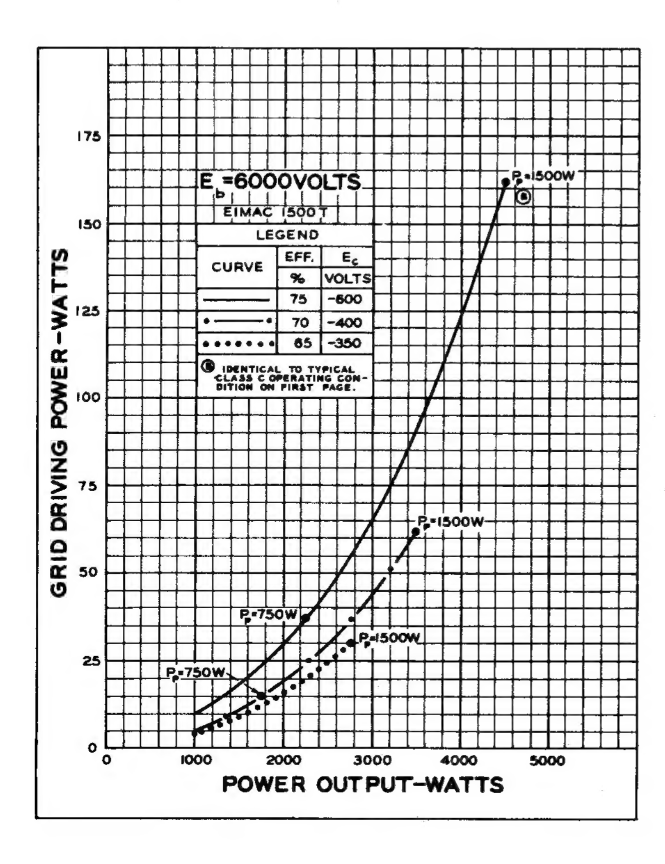


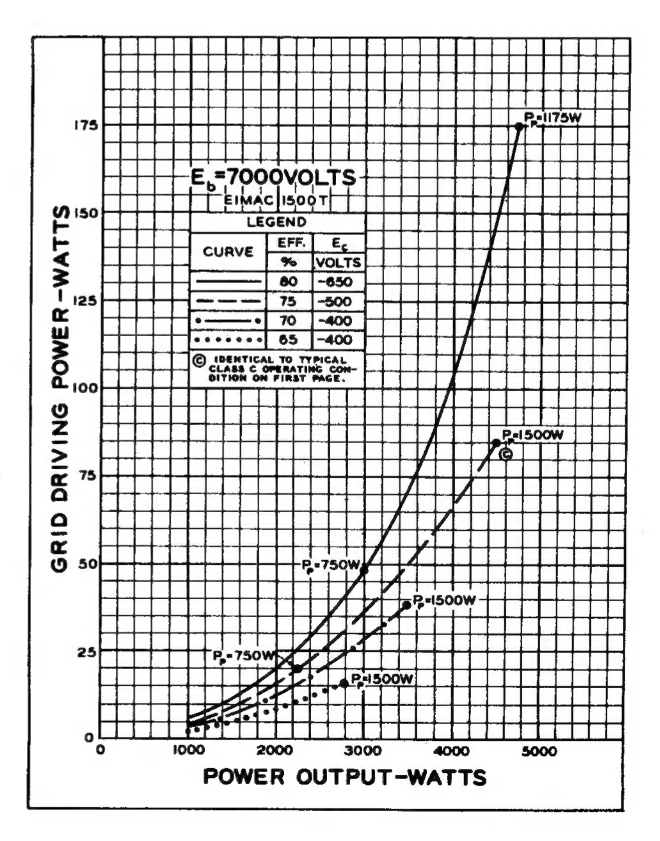
DRIVING POWER vs. POWER OUTPUT

The three charts on this page show the relationship of plate efficiency, power output and grid driving power at plate voltages of 5000, 6000, and 7000 volts. These charts show combined grid and bias losses only. The driving power and power output figures do not include circuit losses. The plate dissipation in watts is indicated by P_p.

Points A, B, and C are identical to the typical Class C operating conditions shown on the first page under 5000, 6000, and 7000 volts respectively.







EIMAC 1500T CONSTANT CURRENT CHARACTERISTICS

GRID VOLTAGE — VOLTS

-600 -400 -200 0 200 400 600 800 1000 1200

PLATE VOLTAGE — VOLTS

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000

PLATE CURRENT-AMPERES

0 .100 .500 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.0

GRID CURRENT-AMPERES

2.40 2.00 1.80 1.60 1.40 1.20 1.00 .800 .600 .400 .200 .100 .050 0 -.050 -.100

.030 0 -.050 -.100

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